

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

ROOF RUNOFF STRUCTURE

(No.)

CODE 558

DEFINITION

Structures that collect, control, and transport precipitation from roofs.

PURPOSE

This practice may be applied as a part of a resource management system to support one or more of the following purposes:

- Improve water quality
- Reduce soil erosion
- Increase infiltration
- Protect structures
- Increase water quantity

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Roof runoff structures are a component of an overall resource management system
- Roof runoff needs to be diverted away from structures or contaminated areas
- There is a need to collect, control, and transport runoff from roofs to a stable outlet
- Roof runoff is collected and used for other purposes

CRITERIA

General Criteria Applicable To All Purposes

Design Capacity. At minimum, a 10-year frequency, 5-minute rainfall precipitation event shall be used to design roof runoff structures, except where excluding roof runoff from manure management systems.

In that case, a 25-year frequency, 5-minute precipitation event shall be used to design roof runoff structures (Refer to AWMFH, Chapter 10, Appendix 10B). When gutters are used, the capacity of the downspout(s) must equal or exceed the gutter flow rate.

Outlets. Runoff may empty into surface or underground outlets, or onto the ground surface. Surface and underground outlets shall be sized to ensure adequate design capacity and shall provide for clean-out as appropriate. When runoff from roofs empties onto the ground surface, a stable outlet shall be provided. When runoff is conveyed through a gutter and downspout system, an elbow and energy dissipation device shall be placed at the end of the downspout to provide a stable outlet and direct water away from the building. Outlets must not discharge near wells, septic system drain fields, basements, or buried tanks. Discharge runoff a minimum of five feet from the structure and slope the discharge area away from the structure.

Surface or ground outlets such as rock pads, rock filled trenches with subsurface drains, concrete and other erosion-resistant pads, or preformed channels may be used, particularly where snow and ice are a significant load component on roofs.

Supports. Building roof structure must have sufficient strength to support gutter loads. Gutter and downspout supports shall have sufficient strength to support anticipated design loads. They shall have a maximum spacing of 48 inches for galvanized steel and 32 inches for aluminum or plastic. Wood gutters shall be mounted on fascia boards using furring blocks that are a maximum of 24 inches apart. Downspouts shall be securely fastened at the top and bottom with intermediate supports that are a maximum of 10 feet apart.

Design loads shall include loading from snow and ice accumulation expected in the region. Gutters shall be installed below the projection of the roofline to reduce gutter damage from snow and ice.

Materials. Roof runoff structures shall be made of durable materials with a minimum design life of ten years. Roof gutters and downspouts may be made of aluminum, galvanized steel, wood, or plastic. Aluminum gutters and downspouts shall have a nominal thickness of 0.027 inches and 0.020 inches, respectively. Galvanized steel gutters and downspouts shall be at least 28 gauge. Wood shall be clear and free of knots. Wood may be redwood, cedar, cypress, or pressure treated wood. Plastics shall contain ultraviolet stabilizers. Dissimilar metals shall not be in contact with each other.

Rock-filled trenches and pads shall consist of poorly graded rock (all rock fragments approximately the same size) and be free of appreciable amounts of sand and/or soil particles. Crushed limestone shall not be used for backfill material unless it has been washed. Subsurface drains or outlets shall meet the material requirements of Underground Outlet (620).

Concrete appurtenances used shall meet the requirements of NRCS Construction Specification 32, Concrete for Minor Structures.

Protection. Roof runoff structures shall be protected from damage by livestock and equipment.

Additional Criteria To Increase Infiltration

Runoff shall be routed onto pervious landscaped areas (e.g.: lawns, mass planting areas, infiltration trenches, and natural areas) to increase infiltration of runoff. These areas shall be capable of infiltrating the runoff in such a way that replenishes soil moisture without adversely affecting the desired plant species.

Additional Criteria To Protect Structures

Runoff shall be directed away from structure foundations to avoid wetness and hydraulic loading on the foundation.

On expansive soils or bedrock, downspout extensions shall be used to discharge runoff a minimum of 5 feet from the structure.

The discharge area for runoff must slope away from the protected structure.

Additional Criteria To Increase Water Quantity

Structures needed to collect and store water from roofs for potable and non-potable purposes shall be designed and installed in accordance with sound engineering principles. Storage structures for non-potable purposes such as irrigation water should be designed in accordance with NRCS conservation practice standards, as appropriate.

Potable water storage structures (cisterns) should be constructed of materials and in a manner that will not increase the contamination of the stored water. Roof runoff collected and stored for potable uses must be treated prior to consumption and should be tested periodically to assure that adequate quality is maintained for human consumption.

CONSIDERATIONS

Avoid discharging outlets near wells or into structures that discharge directly into surface waters.

PLANS AND SPECIFICATIONS

The following list of Construction Specifications is intended as a guide to selecting the appropriate specifications for a specific project. The list includes most, but may not contain all, of the specifications needed for a specific project:

IA-1	Site Preparation
IA-3	Structural Removal
IA-5	Pollution Control
IA-21	Excavation
IA-23	Earthfill
IA-24	Drainfill
IA-32	Concrete for Nonstructural Slabs
IA-45	Plastic (PVC, PE) Pipe
IA-81	Metal Fabrication and Installation
IA-83	Timber Fabrication and Installation

Plans and specifications for installing roof runoff structures shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The plans and specifications shall show the location, spacing, size, and grade of all gutters and downspouts and type and quality of material to be used.

Plans and specifications for other practices essential to the proper functioning of the roof runoff structure, such as underground outlet, shall be included.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be developed that is consistent with the purpose(s) of the practice, intended life, safety requirements, and the criteria for the design. The plan shall contain, but not be limited to, the following provisions:

- Keep roof runoff structures clean and free of obstructions that reduce flow
- Make regular inspections and perform maintenance as needed to ensure proper functioning of the roof runoff structure

REFERENCES

USDA-NRCS, National Engineering Handbook (NEH), Part 651, Agricultural Waste Management Field Handbook (AWMFH)